

## PATENT

Attorney Docket No. A-71184/DJB/VEJ/RBE  
Attorney Matter No. 461124-00020  
Application No. 09/980,956

*In the Claims:*

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Cancelled)
2. (Currently amended) A planar fuel cell stack according to claim ~~[[25]]~~13 wherein the layer of copper or copper-based alloy of the gas separator member has a thickness in the range of from about 0.1mm to about 4mm.
3. (Previously presented) A planar fuel cell stack according to claim 2 wherein the layer of copper of the gas separator member has a thickness in the range of from about 0.1mm to about 1mm.
4. (Currently amended) A planar fuel cell stack according to claim ~~[[25]]~~13 wherein the copper-based alloy of the gas separator member comprises copper alloyed with up to a maximum of 50 wt% of one or more alloying elements selected from the group consisting of Al, Ni, Zn, Sn, Fe, Be, Ag, Au, Mn, Si, P, and Pb.
5. (Currently amended) A planar fuel cell stack according to claim ~~[[25]]~~13 wherein the layer of oxidation resistant material on the gas separator member has a thickness in the range of about 50 to about 1000 microns.
6. (Currently amended) A planar fuel cell stack according to claim ~~[[25]]~~15 wherein the layer of oxidation resistant material on the gas separator member is selected from the group consisting of a foil attached to the layer of copper or copper-based alloy, a coating on the layer of copper or copper-based alloy and a substrate onto which the layer of copper or copper-based alloy is coated.
7. (Previously presented) A planar fuel cell stack according to claim 6 wherein the layer of oxidation-resistant material on the gas separator member is a foil or a substrate and comprises a heat resistant steel.

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8. (Previously presented) A planar fuel cell stack according to claim 7 wherein the heat resistant steel is coated with alumina on the cathode side of the gas separator member.

9. (Previously presented) A planar fuel cell stack according to claim 7 wherein the heat resistant steel contains at least 4 wt% aluminium and forms a surface layer of alumina on the gas separator member at least at the operating temperature of the fuel cell stack.

10 (Previously presented) A planar fuel cell stack according to claim 6 wherein the layer of copper or copper-based alloy of the gas separator member is coated with plural layers on the cathode side which together form the layer of oxidation-resistant material.

11. (Previously presented) A planar fuel cell stack according to claim 6 wherein the oxidation resistant material of the gas separator member comprises  $\text{Al}_2\text{O}_3$  applied to the layer of copper or copper-based alloy as an alumina coating.

12. (Previously presented) A planar fuel cell stack according to claim 6 wherein the oxidation resistant material of the gas separator member comprises  $\text{Al}_2\text{O}_3$  applied to the layer of copper or copper-based alloy as an aluminium coating which is subsequently oxidised.

13. (Currently amended) A planar fuel cell stack including at least two planar solid oxide fuel cells each having a layer of solid oxide electrolyte, an anode layer on one side of the electrolyte layer and a cathode layer on the other side of the electrolyte layer, and a gas separator member between the at least two fuel cells, wherein the gas separator member has an anode side and a cathode side and comprises a layer consisting of copper or of copper-based alloy containing at least 50 wt% Cu, a layer of oxidation-resistant material on the cathode side of the copper or copper-based alloy layer and a protective layer on the anode side of the copper or copper-based alloy layer to prevent Cu vapour escaping from the anode side of the gas separator member at the operating temperature of the stack, ~~[[according to claim 12]]~~ wherein the oxidation resistant material of the gas separator member comprises  $\text{Al}_2\text{O}_3$  applied to the layer of copper or copper-based alloy as an aluminium coating which is subsequently oxidised, and

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wherein the aluminium coating is at least partly diffused into a cathode-side surface portion of the layer of copper or copper-based alloy prior to being oxidised.

14. (Cancelled)

15. (Previously presented) A planar fuel cell stack including at least two planar solid oxide fuel cells each having a layer of solid oxide electrolyte, an anode layer on one side of the electrolyte layer and a cathode layer on the other side of the electrolyte layer, and a gas separator member between the at least two fuel cells, wherein the gas separator member has an anode side and a cathode side and comprises a layer of copper or of copper-based alloy containing at least 50 wt% Cu, a layer of oxidation-resistant material on the cathode side of the copper or copper-based alloy layer and a protective layer on the anode side of the copper or copper-based alloy layer to prevent Cu vapor escaping from the anode side of the gas separator member at the operating temperature of the stack, wherein the protective layer of the gas separator member is of heat resistant steel.

16. (Previously presented) A planar fuel cell stack according to claim 15 wherein the heat resistant steel of the protective layer of the gas separator member is in the form of a foil.

17. (Currently amended) A planar fuel cell stack according to claim ~~[[25]]~~13 wherein the protective layer of the gas separator member comprises Al<sub>2</sub>O<sub>3</sub> applied to the layer of copper or copper-based alloy as an alumina coating.

18. (Currently amended) A planar fuel cell stack according to claim ~~[[25]]~~13 wherein the protective layer of the gas separator member comprises Al<sub>2</sub>O<sub>3</sub> applied to the layer of copper or copper-based alloy as an aluminium coating which is subsequently oxidised.

19. (Currently amended) A planar fuel cell stack including at least two planar solid oxide fuel cells each having a layer of solid oxide electrolyte, an anode layer on one side of the electrolyte layer and a cathode layer on the other side of the electrolyte layer, and a gas separator member between the at least two fuel cells, wherein the gas separator member has an anode side and a cathode side and comprises a layer consisting of copper or of copper-based alloy

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containing at least 50 wt% Cu, a layer of oxidation-resistant material on the cathode side of the copper or copper-based alloy layer and a protective layer on the anode side of the copper or copper-based alloy layer to prevent Cu vapour escaping from the anode side of the gas separator member at the operating temperature of the stack, [[according to claim 18]] wherein the protective layer of the gas separator member comprises  $\text{Al}_2\text{O}_3$  applied to the layer of copper or copper-based alloy as an aluminium coating which is subsequently oxidised, and wherein the aluminium coating is at least partly diffused into an anode-side surface portion of the layer of copper or copper-based alloy of the gas separator member prior to being oxidised.

20. (Currently amended) A planar fuel cell stack according to claim ~~[[25]]~~13 wherein the protective layer of the gas separator member is made up of plural layers, namely a metal barrier layer applied to the layer of copper or copper-based alloy and formed of a material selected from the group consisting of W, Ta, Nb and an alloy of one or more of said metals which does not dissolve into the layer of copper or copper-based alloy, an intermediate layer of Ag on the metal barrier layer, and a barrier layer on the intermediate layer formed of a metal selected from the group consisting of Ni, a noble metal except Ag and an alloy of one or more of Ni and noble metals except Ag.

21. (Cancelled)

22. (Previously presented) A planar fuel cell stack according to claim 29 wherein the aluminium bronze of the gas separator member contains at least 5 wt% Al.

23. (Previously presented) A planar fuel cell stack according to claim 29 wherein the gas separator member has a thickness in the range of from about 1mm to about 4mm.

24. (Cancelled)

25. (Cancelled)

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26. (Currently amended) A planar fuel cell stack according to claim 4 wherein the copper is alloyed with up to a maximum of about 20 [[wt %]] wt% of said one or more alloying elements.

27. (Previously presented) A planar fuel cell stack according to claim 15 wherein the heat resistant steel of the protective layer of the gas separator member has a surface layer of alumina on the anode side of the gas separator member.

28. (Previously presented) A planar fuel cell stack according to claim 27 wherein the heat resistant steel of the protective layer of the gas separator member contains at least 4 wt% aluminium.

29. (Previously presented) A planar fuel cell stack including at least two planar solid oxide fuel cells each having a layer of solid oxide electrolyte, an anode layer on one side of the electrolyte layer and a cathode layer on the other side of the electrolyte layer, and a gas separator member between the at least two fuel cells, wherein the gas separator member has an anode side and a cathode side and comprises a layer of aluminium bronze, a layer of alumina on the cathode side of the layer of aluminium bronze to provide oxidation resistance and a protective layer of alumina on the anode side of the layer of aluminium bronze to prevent Cu vapour escaping from the anode side of the gas separator member at the operating temperature of the stack.

30. (New) A planar fuel cell stack according to claim 15 wherein the layer of copper or copper-based alloy of the gas separator member has a thickness in the range of from about 0.1mm to about 4mm.

31. (New) A planar fuel cell stack according to claim 30 wherein the layer of copper of the gas separator member has a thickness in the range of from about 0.1mm to about 1mm.

32. (New) A planar fuel cell stack according to claim 15 wherein the copper-based alloy of the gas separator member comprises copper alloyed with up to a maximum of 50 wt% of one or more alloying elements selected from the group consisting of Al, Ni, Zn, Sn, Fe, Be, Ag, Au, Mn, Si, P, and Pb.

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33. (New) A planar fuel cell stack according to claim 15 wherein the layer of oxidation resistant material on the gas separator member has a thickness in the range of about 50 to about 1000 microns.
34. (New) A planar fuel cell stack according to claim 12 wherein the aluminium coating is at least partly diffused into a cathode-side surface portion of the layer of copper or copper-based alloy prior to being oxidised.
35. (New) A planar fuel cell stack according to claim 32 wherein the copper is alloyed with up to a maximum of about 20 wt% of said one or more alloying elements.
36. (New) A planar fuel cell stack according to claim 19 wherein the layer of copper or copper-based alloy of the gas separator member has a thickness in the range of from about 0.1mm to about 4mm.
37. (New) A planar fuel cell stack according to claim 36 wherein the layer of copper of the gas separator member has a thickness in the range of from about 0.1mm to about 1mm.
38. (New) A planar fuel cell stack according to claim 19 wherein the copper-based alloy of the gas separator member comprises copper alloyed with up to a maximum of 50 wt% of one or more alloying elements selected from the group consisting of Al, Ni, Zn, Sn, Fe, Be, Ag, Au, Mn, Si, P, and Pb.
39. (New) A planar fuel cell stack according to claim 19 wherein the layer of oxidation resistant material on the gas separator member has a thickness in the range of about 50 to about 1000 microns.
40. (New) A planar fuel cell stack according to claim 19 wherein the layer of oxidation resistant material on the gas separator member is selected from the group consisting of a foil attached to the layer of copper or copper-based alloy, a coating on the layer of copper or copper-based alloy and a substrate onto which the layer of copper or copper-based alloy is coated.

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41. (New) A planar fuel cell stack according to claim 40 wherein the layer of oxidation-resistant material on the gas separator member is a foil or a substrate and comprises a heat resistant steel.
42. (New) A planar fuel cell stack according to claim 41 wherein the heat resistant steel is coated with alumina on the cathode side of the gas separator member.
43. (New) A planar fuel cell stack according to claim 41 wherein the heat resistant steel contains at least 4 wt% aluminium and forms a surface layer of alumina on the gas separator member at least at the operating temperature of the fuel cell stack.
44. (New) A planar fuel cell stack according to claim 40 wherein the layer of copper or copper-based alloy of the gas separator member is coated with plural layers on the cathode side which together form the layer of oxidation-resistant material.
45. (New) A planar fuel cell stack according to claim 38 wherein the copper is alloyed with up to a maximum of about 20 wt% of said one or more alloying elements.
46. (New) A planar fuel cell stack according to claim 13 wherein the protective layer of the gas separator member is of heat resistant steel.
47. (New) A planar fuel cell stack according to claim 46 wherein the heat resistant steel of the protective layer of the gas separator member is in the form of a foil.
48. (New) A planar fuel cell stack according to claim 18 wherein the aluminium coating is at least partly diffused into an anode-side surface portion of the layer of copper or copper-based alloy of the gas separator member prior to being oxidised.
49. (New) A planar fuel cell stack according to claim 46 wherein the heat resistant steel of the protective layer of the gas separator member has a surface layer of alumina on the anode side of the gas separator member.

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50. (New) A planar fuel cell stack according to claim 49 wherein the heat resistant steel of the protective layer of the gas separator member contains at least 4 wt% aluminium.

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